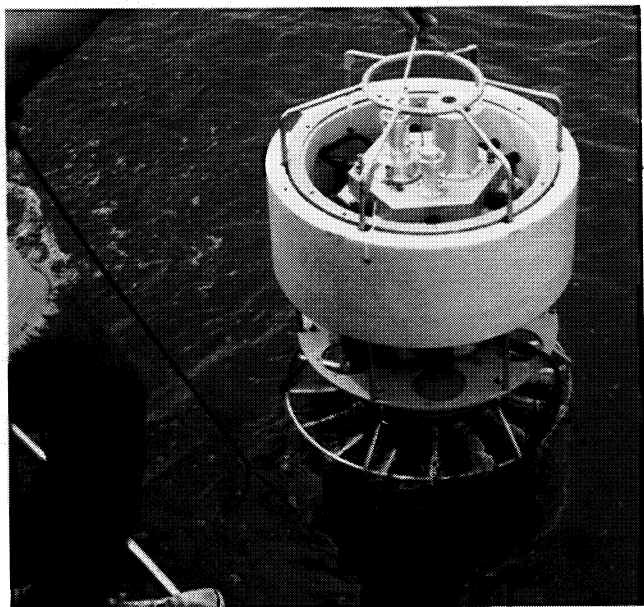


Water Quality Monitor

To meet a need of the Environmental Protection Agency (EPA), Langley Research Center has developed an automated Water Quality Monitoring System based on aerospace microelectronics and data acquisition technologies. Designed for unattended operation in water depths up to 100 feet, the system consists of a subsurface buoy anchored in the water, a surface control unit (SCU) and a hydrophone link for acoustic communication between buoy and SCU.

The subsurface buoy—shown being lowered into the water (below) and in laboratory view (right)—is the primary functional unit. It incorporates 16 cells for water sampling, plus sensors for eight water quality measurements, such as temperature, pressure, alkalinity, dissolved oxygen, fluoride content and other conditions. The buoy contains all the electronic equipment necessary for collecting and storing sensor data, including a microcomputer and a memory unit. Power for the electronics is supplied by a nickel cadmium battery designed to operate for two weeks before recharge is required.

Through the hydrophone link, the subsurface buoy reports its data to the SCU, which relays it to land stations. The link allows two-way communications, so the SCU can send instructions to the buoy, for example, commands to transmit data or to change the water sampling schedule. If the buoy springs a leak or runs low on battery power, the system automatically shuts down and sends a "pinging" alert signal. For recovery, a sequence of commands sent via the hydrophone link causes the buoy to release from its anchor and float to the surface for pick-up by boat; a locator pinger guides the boat crew to the buoy's position.



The monitor demonstrated its ability to provide voluminous water quality data in a seven-day field test at Saginaw Bay, an eastern Michigan arm of Lake Huron. In these tests, the system used only one-third of its battery energy supply, indicating that it could function well beyond the design goal of two weeks. On completion of the field tests, the monitor was turned over to EPA's Large Lakes Research Station, Grosse Ile, Michigan.

